

WHAT IS CLAIMED IS:

1. A waste heat utilizing system for an automotive vehicle comprising:

a waste heat collecting cycle for collecting waste heat from an internal combustion engine and having an expansion device for generating rotational driving force from the collected waste heat;

a refrigerating cycle having a compressor device for compressing a refrigerant; and

a power transmitting means driven by an outside driving source and operatively connected to the compressor device to rotationally drive the same,

wherein the expansion device is operatively connected to the compressor device to rotationally drive the same.

2. A waste heat utilizing system according to Claim 1, wherein the outside driving source is the internal combustion engine.

3. A waste heat utilizing system according to Claim 2, further comprising an on-and-off means provided between the power transmitting means and the compressor device for intermittently transmitting the driving force from the power transmitting means to the compressor device.

4. A waste heat utilizing system according to one of Claims 1 through 3, further comprising a one-way clutch provided between the expansion device and the compressor device for transmitting the driving force from the expansion device to the compressor device.

5. A waste heat utilizing system according to one of Claims 1 through 3, further comprising a one-way clutch provided between the power transmitting means and the compressor device for transmitting the driving force from the power transmitting means to the compressor device.

6. A waste heat utilizing system according to one of Claims 1 through 3, wherein the compressor device comprises a variable discharge type compressor.

7. A waste heat utilizing system according to one of Claims 1 through 3, further comprising an electric rotating machine which can be operated as both an electric motor and an electric power generator, wherein the electric rotating machine is operatively connected to the compressor device.

8. A waste heat utilizing system for an automotive vehicle comprising:

a waste heat collecting cycle for collecting waste heat from an internal combustion engine and having an expansion device for generating rotational driving force by expanding superheated working fluid heated by the collected waste heat;

a power transmitting means rotationally driven by a driving force generating means; and

an electric rotating machine operatively connected to the power transmitting means and rotationally driven by the power transmitting means;

wherein the expansion device is operatively connected to the

electric rotating machine to rotationally drive the same.

9. A waste heat utilizing system according to Claim 8, further comprising a one-way clutch provided between the power transmitting means and the electric rotating machine, wherein the power transmitting means, the electric rotating machine and the expansion device are coaxially and operatively connected with one another.

10. A waste heat utilizing system for an automotive vehicle comprising:

a waste heat collecting cycle for collecting waste heat from an internal combustion engine and having an expansion device for generating rotational driving force from the collected waste heat;

a refrigerating cycle having a compressor device for compressing a refrigerant; and

a power transmitting means driven by an outside driving source and operatively connected to the compressor device to rotationally drive the same,

wherein the expansion device is operatively connected to the compressor device to rotationally drive the same.

11. A waste heat utilizing system according to Claim 10, wherein the power transmitting means comprises at least one of the following components:

a pulley operatively connected to the internal combustion engine and rotationally driven by the same; and

an electric rotating machine having both functions of an electric motor for generating a rotational driving force and an

electric power generator for generating electric power when driven by the outside driving source.

12. A waste heat utilizing system according to Claim 11, wherein the expansion device is operatively connected to the pulley of the power transmitting means, and the pulley transmits the driving force from the expansion device to the internal combustion engine when the driving force generated at the expansion device is applied to the pulley.

13. A waste heat utilizing system according to Claim 11, wherein the expansion device is operatively connected to the electric rotating machine of the power transmitting means, and the electric rotating machine will be operated as the electric power generator when the driving force generated at the expansion device is applied to the electric rotating machine.

14. A waste heat utilizing system according to one of Claims 10 to 13, further comprising a first on-and-off means provided between the power transmitting means and the compressor device for intermittently transmitting the driving force from the power transmitting means to the compressor device, wherein the first on-and-off means is turned to its off-state when the driving force of the expansion device is transmitted to the compressor device.

15. A waste heat utilizing system according to one of Claims 10 to 15, further comprising a second on-and-off means provided between the expansion device and the compressor device for

intermittently transmitting the driving force from the expansion device to the compressor device, wherein the second on-and-off means is turned to its off-state when the driving force of the waste heat collecting cycle is not operated.

16. A waste heat utilizing system according to Claim 10, wherein the power transmitting means comprises:

a pulley operatively connected to the internal combustion engine and rotationally driven by the same; and

an electric rotating machine having both functions of an electric motor for generating a rotational driving force and an electric power generator for generating electric power when driven by the outside driving source,

wherein the compressor device, the pulley and the electric rotating machine are operatively connected to each other by a power distributing and transmitting means, which distributes and transmits the driving force from the expansion device to the compressor device and to the electric rotating machine.

17. A waste heat utilizing system according to Claim 10, wherein the power transmitting means comprises:

a pulley operatively connected to the internal combustion engine and rotationally driven by the same; and

an electric rotating machine having both functions of an electric motor for generating a rotational driving force and an electric power generator for generating electric power when driven by outside driving source,

wherein the compressor device, the pulley and the electric rotating machine are operatively connected to each other by a power distributing and transmitting means, which distributes and transmits the driving force from the pulley to the compressor device and to the electric rotating machine.

18. A waste heat utilizing system according to Claim 10, wherein the power transmitting means comprises an electric rotating machine having both functions of an electric motor for generating a rotational driving force and an electric power generator for generating electric power when driven by outside driving source,

wherein the expansion device, compressor device and the electric rotating machine are operatively connected to each other by a power distributing and transmitting means, which distributes and transmits the driving force from the expansion device to the compressor device and to the electric rotating machine.

19. A waste heat utilizing system according to one of Claims 10 to 13, further comprising a condenser means working in the waste heat collecting cycle and refrigerating cycle, wherein the working fluid for the waste heat collecting cycle is the same to that for the refrigerating cycle, and the condenser means is commonly used in the waste heat collecting and refrigerating cycles.

20. A waste heat utilizing system according to one of Claims 10 to 13, wherein each of the waste heat collecting cycle and the refrigerating cycle comprises a condenser, wherein the working fluid for the waste heat collecting cycle is the same to that for the

refrigerating cycle, and wherein the waste heat utilizing system further comprising:

an inlet side passage connecting both inlets of the condensers with each other;

an outlet side passage connecting both outlets of the condensers with each other; and

valves respectively provided in the inlet side and outlet side passages and for opening and closing the same,

wherein the valves are opened when only one of the waste heat collecting cycle and the refrigerating cycle is operated, so that the working fluid of the waste heat collecting cycle and refrigerating cycle flows through both of the condensers.